

**Before the  
Federal Communications Commission  
Washington, D.C. 20554**

In the Matter of	)	
	)	
Digital Audio Broadcasting Systems	)	MM Docket No. 99-325
And Their Impact on the Terrestrial	)	
Radio Broadcast Service	)	

**COMMENTS OF HARRIS CORPORATION**

Harris Corporation (“Harris”) respectfully submits these comments in response to the Federal Communications Commission’s (“Commission’s”) Further Notice of Proposed Rulemaking and Notice of Inquiry (“FNPRM”) in the above captioned proceeding concerning the final operational requirements and related broadcast licensing and service rule changes for digital audio broadcasting (“DAB”) systems.<sup>1</sup>

I. Introduction and Summary

Harris is an international communications equipment company with five operating divisions that offer products and services in the microwave, broadcast, network support, secure tactical radio, and government communications systems markets. As the world’s leading broadcast transmission equipment supplier, Harris’ Broadcast Communication Division is the leader in digital solutions for television broadcasting and has been at the forefront of the transition to digital television, supplying the majority of the digital television transmitters and encoders in the United States.

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<sup>1</sup> *In the Matter of Digital Audio Broadcast Systems And Their Impact on the Terrestrial Radio Broadcast Service*, MM Docket No. 99-325, *Further Notice of Proposed Rulemaking and Notice of Inquiry*, FCC 04-99, April 20, 2004.

In addition, Harris is the only manufacturer to offer a complete line of AM and FM digital ready transmitters at all power levels. As a leader in digital radio, Harris is the first company in the world to offer its own high-definition (“HD”) exciter and the first to incorporate correction and linearization in the transmitter for FM HD radio, resulting in a more efficient transmission system and greater spectral purity. During fiscal 2003, Harris introduced several new products for the HD radio market, including, a revolutionary, one-box networking solution that can be configured to provide a level of functionality that traditionally required up to 14 separate components, a CODEC pre-conditioner that offers a quantum leap in audio digital signal processing within existing bit constraints and a digital low-power AM transmitter line. In addition, Harris is a member of National Public Radio's (“NPR’s”) Tomorrow Radio team and a co-developer of the multicasting technology that permits multi-channel audio capability.

150 of the nation’s 16,000 radio stations already have purchased HD radio transmitters from Harris. The broadcast groups selecting Harris for their digital radio transition during fiscal 2003 include Radio One, Cox Radio, Clear Channel, Hispanic Broadcasting Corporation, Beasley Broadcast Group, the West Virginia Radio Corporation, Infinity, Susquehanna, Journal Broadcast, and the American Christian Network.

Harris partnered with iBiquity Digital Corporation (“iBiquity”) to develop digital HD radio technology and has been a driving force in the development and testing of the In-Band On-Channel (“IBOC”) standard. iBiquity’s IBOC technology allows broadcasters to offer an expanding range of new digital information and entertainment services. Harris worked with National Public Radio and the NRSC to guide iBiquity in

the implementation of an improved audio CODEC to assure audio quality and to ensure the capability to add multiple audio channels. Consumers will not only enjoy improved audio quality and integrated audio related information, but will also benefit from increased control over their listening experience, new supplementary audio services and valuable information services.

To ensure the deployment of HD radio proceeds efficiently, Harris urges the Commission to utilize the following principles as guidance through the rulemaking process: 1) the Commission should permit the technology to be the primary determinant in the roll-out of digital radio; 2) the Commission should provide radio broadcasters with flexibility in implementing digital radio; and, 3) by creating a flexible regulatory environment the Commission will ensure that HD radio fosters diversity, localism and promotes critical emergency services.

## II. The Commission Should Ensure Technology Drives The Deployment of Digital Radio.

The FNPRM seeks comments on how many audio streams a radio station can transmit using IBOC without causing interference or degrading audio quality and whether the availability of additional audio streams spurs public demand for digital audio receivers.<sup>2</sup> As consumers discover the innovative service offerings, flexibility and interactivity options of the HD radio service, Harris believes that the demand for the digital receivers will increase as well.

Harris urges the Commission to refrain from issuing regulations that will mandate a minimum or maximum number of audio streams a radio station may transmit at this early stage in the DAB roll-out. The viability of subdividing the HD radio 96 kbps data

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<sup>2</sup> *Id.* at para. 20.

stream into multiple data streams for purposes of broadcasting audio programming was demonstrated by NPR's Tomorrow Radio testing.<sup>3</sup> In these tests, the 96 kbps Main Audio Program ("MAP") data stream was divided into a 64 kbps MAP channel and a 32 kbps supplemental audio channel ("SAC"). The 64 kbps MAP channel behaved identically to the standard 96 kbps MAP channel, featuring blend to analog when the digital signal is lost.<sup>4</sup> The Tomorrow Radio testing demonstrates that multiple audio streams are possible without degrading audio quality or causing interference to other adjacent users in the band. In fact, the number of audio channels being transmitted has no impact on the interference potential to others due to the fact that the overall RF bandwidth of the HD radio signal does not change—it is a constant—regardless of the number of audio streams being transmitted. Given these test results, there may be stations that choose to divide the data stream into a 64 kbps MAP channel and a 32 kbps SAC channel. However, as the audio encoding technology evolves, there may be stations that realize that they can operate as many as four channels without causing significant degradation in the audio quality.

By recognizing the dynamic nature of the technology, the Commission should adopt rules that empower broadcasters to experiment with the technology and perhaps develop innovations in the IBOC standard that we cannot foresee today.

The Commission also seeks guidance on whether rules adopted in this proceeding should facilitate the establishment of additional digital boosters to fill-in areas with poor analog coverage and whether stations converting their main signal be required to

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<sup>3</sup> Letter to Marlene H. Dortch, Secretary of FCC from Michael Riksen, VP Government Relations, NPR, March 10, 2004, MM Docket No. 99-325.

<sup>4</sup> *Id.*

simultaneously convert their boosters and/or translators.<sup>5</sup> Harris urges the Commission to adopt rules to facilitate the establishment of additional digital boosters and/or translators. Certainly, a station that has coverage concerns should be permitted to deploy digital boosters to provide radio broadcast services in areas with poor analog coverage. Harris supports such policies because they ensure that members of rural or underserved communities have access to radio programming and, in the event of emergencies, critical information relating to relief services and status of public sector services.

Although we strongly recommend that the Commission adopt rules to ensure the establishment of additional digital boosters and translators to fill-in areas with poor analog service, we caution the Commission against adopting rules that mandate that stations converting their main signal also be required to simultaneously convert their boosters and translators. Each station should determine the importance and viability of converting its digital boosters/translators. By adopting rules that mandate radio station broadcasters simultaneously convert their boosters and translators, the Commission may be creating a disincentive to radio stations to convert their primary station to HD radio. Most radio stations make decisions regarding equipment upgrades based on the realities of their revenue streams. If the Commission were to mandate that any station converting to digital also simultaneously convert its boosters/translators, many radio stations might view the additional costs as unduly burdensome and forgo conversion in the immediate future and, perhaps, indefinitely. While Harris supports establishing rules to support the establishment of digital boosters, Harris recommends against imposing any mandates on the conversion of digital boosters and translators.

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<sup>5</sup> *Id.* at para. 54.

### III. The Commission Should Provide Radio Broadcasters with Flexibility in Rolling-Out Digital Radio

As the Commission noted in the FNPRM, over 280 radio stations encompassing more than 100 markets “have licensed iBiquity’s technology and have begun digital audio broadcasting or are in the process of converting.”<sup>6</sup> Without final technical/service rules, these radio broadcasters recognized the importance and potential value of conversion to HD radio and have made the financial commitment necessary to convert. As the FNPRM notes: “A flexible DAB service policy would likely increase the ability of broadcasters to compete in an increasingly competitive marketplace, and would allow them to serve the public with new and innovative services.”<sup>7</sup>

In this context, the FNPRM seeks comments on whether the Commission should require broadcasters to provide a minimum amount of HD audio content and, if so, what minimum amount should be required.<sup>8</sup> Harris urges the Commission to refrain from mandating minimum requirements for HD audio content. Naturally, those broadcasters that are producing content in HD format will broadcast, in all likelihood, HD content over-the-air for consumers to enjoy. However, mandating that broadcasters provide a minimum amount of HD content unduly pressures broadcasters to make investments in equipment that they may not be prepared to make.

As radio broadcasters convert to digital transmission—producing high-definition content will be the natural “next step” to attract and retain audience. Moreover, in the digital television proceeding, the Commission did not mandate that television

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<sup>6</sup> *Id.* at para. 13.

<sup>7</sup> *Id.* at para. 18.

<sup>8</sup> *Id.* at para. 19.

broadcasters provide a minimum amount of HD video content and radio broadcasters should not be treated differently.

Specifically, in the digital television proceeding, the Commission noted:

Our decisions today, and our previous adoption of the DTV Standard, give broadcasters the opportunity to provide high definition television programming, but we decline to impose a requirement that broadcasters provide a minimum amount of such programming and, instead, leave this decision to the discretion of licensees. The DTV Standard will allow broadcasters to offer the public high definition television, as well as a broad variety of other innovative services. We believe that we should allow broadcasters the freedom to innovate and respond to the marketplace in developing the mix of services they will offer the public. In this regard, we endeavor to carry out the premises of the 1996 Act, which, as noted above, seeks "to promote competition and reduce regulation in order to secure lower prices and higher quality services for American telecommunications consumers and encourage the rapid deployment of new telecommunications technologies."<sup>9</sup>

Harris encourages the Commission to provide radio broadcasters with the same flexibility enjoyed by television broadcasters on the issue of HD content. Harris points to the increased development of HD content in the television context despite the lack of a regulatory mandate from the Commission. Similarly, Harris expects radio broadcasters converting to HD radio to begin developing content that will maximize the benefits of the technology.

The Commission also seeks comments on whether it should adopt a flexible policy that would permit radio stations to produce and distribute any and all types of datacasting services.<sup>10</sup> Datacasting, in both digital radio and digital television, is one of the "new frontiers" that will provide station operators the opportunity to experiment and develop new services that will attract users and listeners and potentially drive future

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<sup>9</sup> *In the Matter of Advanced Television Systems and Their Impact Upon The Existing Television Broadcast Service*, 12 FCC Rcd 12809 (1997) at para. 41.

<sup>10</sup> *Id.* at para. 27.

revenue streams for the stations. Harris urges the Commission to forgo adopting rules that may either mandate or prohibit the production or distribution of datacasting services. Instead, Harris encourages the Commission to adopt rules that provide broadcasters with flexibility to develop such services in the event that a broadcaster determines that the production and distribution of datacasting services makes economic sense.

The Commission also seeks comments on measures to protect established subsidiary communications authorization (“SCA”) services from interference caused by IBOC stations operating on second-adjacent channels.<sup>11</sup> The NPR study cited by the Commission used mathematically averaged receiver performance data to estimate interference potential to listeners in the top 16 radio markets.<sup>12</sup> As the FNPRM noted, the actual interference is not widespread and affects only 2.6% of eligible receivers within an FM station’s service area. Any degradation to the reading services may be ameliorated, at least in part, through antenna alignment. Other options may also include substituting a higher quality analog receiver or if the station chooses to do so, converting to a digital receiver. Harris and NPR will be testing the use of the extended hybrid digital system to provide for a digital transition of radio-reading services.

To further mitigate interference to SCA services, other digital services, and second adjacent channel analog FM services, the Commission should adopt and enforce the revised FM RF mask proposed by iBiquity. Current rules provide that FM radio signals must be attenuated below the level of the unmodulated carrier frequency: (1) by at least 25 dB at any frequency removed from the center frequency by 120 kHz up to 240 kHz; (2) by at least 35 dB at any frequency removed from the center frequency by 240 kHz up to and

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<sup>11</sup> *Id.* at para. 28.

<sup>12</sup> *Id.*



including 600 kHz; and (3) by at least  $43 \text{ dB} + 10 \log (\text{power, in watts}) \text{ dB}$  on any frequency removed by more than 600 kHz from the center frequency.<sup>13</sup> Under these rules, some operators are causing interference to SCA, other digital services and most importantly, second adjacent analog FM channels. To mitigate such interference, iBiquity has designed and proposed a more stringent RF emission mask that is designed to operate in concert with the IBOC digital transmission system. The iBiquity proposal requires the emission of the analog FM signal plus the digital IBOC signal to be attenuated below the level of the unmodulated analog carrier frequency by: (1) 40 dB at any frequency removed from the center frequency from 100 kHz up to 200 kHz; (2)  $[-61.4 - (|\text{frequency in kHz}| - 200 \text{ kHz}) * 0.867] \text{ dB}$  at any frequency removed from the center frequency by 200 kHz up to 215 kHz; (3) by at least 74.4 dB at any frequency removed from the center frequency by 215 kHz up to and including 540 kHz; (4) by at least  $[-74.4 - (|\text{frequency in kHz}| - 540 \text{ kHz}) * 0.093] \text{ dB}$  by any frequency removed from the center frequency by 540 kHz up to and including 600 kHz; and, (5) by at least 80 dB on any frequency removed from the center frequency by more than 600 kHz.

Harris strongly urges the Commission to adopt and enforce the proposed iBiquity emission mask described above in order to minimize interference to SCA services and help ensure an efficient HD radio roll-out. Harris is pleased to report that, through the use of advanced pre-correction technology, all Harris IBOC transmitters currently meet this proposed mask.

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<sup>13</sup> 47 CFR § 73.317.

IV. Regulatory Flexibility Will Promote Diversity and Localism and Ensure Critical Emergency Services Are Available to the Public.

HD radio plays an important role in serving the diverse needs of each community. Services such as radio reading services for the blind, foreign language programming and other specialized programming will become more prevalent as radio broadcasters deploy digital radio in their respective communities and adopt digital audio multicasting as methods for generating additional revenue streams. Minority populations in many cities are typically underserved members of the radio community, but with multicasting capabilities, many radio providers will seek to provide programs targeting such communities.

HD radio also will ensure that members of the community have access to important information, in the event of an emergency. Harris supports the contention that free over-the-air audio program services should participate in the emergency alert system, as they do now. However, Harris advises the Commission against adopting rules that would require broadcasters to provide additional, undefined "emergency" services. Such mandates would not further the public interest and may lead to confusion that could disrupt the digital conversion as stations struggle to determine what constitutes an "emergency service."

To forgo such confusion, Harris urges the Commission to consider the recommendation made by the Media Security and Reliability Council with regard to this issue. Specifically, the Communications Infrastructure Working Group recommended that the Commission coordinate the development of a single, ubiquitous digital standard for alert messaging over radio and television. The Report noted, "The importance of one standard, that is developed and accepted before a multitude of incompatible systems arise

on their own, cannot be overstated. EAS must evolve to embrace the digital medium and a common protocol can be a critical element of such a transition.”<sup>14</sup> The Report urges the Commission (in coordination with industry organizations) to foster and coordinate development of a Media Common Alert Protocol (“MCAP”) or similar standard to ensure that emergency messages may be delivered via digital networks. By fostering the development of MCAP (or similar standard) the Commission will help ensure that emergency alerts are reliably transmitted over a digital network.<sup>15</sup>

In addition, the Commission aptly recognized the potential operational challenges confronting EAS analog decoders and seeks comments on the costs and timing involved in having stations update and/or replace their EAS decoders to accommodate the digital portion of the stream.<sup>16</sup> However, the actual development of EAS digital decoders has not been completed. As noted above, the adoption of a single digital standard for EAS is critical and will serve as an impetus for completing the work of the decoders.<sup>17</sup>

## V. Conclusion.

By allowing technology to determine the rate of conversion to HD radio and providing regulatory flexibility to radio broadcasters, the Commission will foster an environment that will facilitate greater HD radio access for all people and serve the Commission’s public interest objectives, including fostering greater diversity and serving underserved segments of the community. Services such as radio-reading services for the

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<sup>14</sup> Media Security and Reliability Council, Report from Communications Infrastructure Working Group, March 2, 2004, page 49.

<sup>15</sup> In Harris’s experience, HD Radio should be fully compatible with the proposed MCAP protocol.

<sup>16</sup> *Supra* note 1 at 38.

<sup>17</sup> Harris estimates the costs of having a complete digital decoder and retransmission encoder to be approximately \$12,000 per station. The price is likely to fall to about \$9,000.00 over time. The EAS analog systems started out around \$9,000.00 and dropped down to about \$5,000.00.

blind, foreign language programming and other specialized programming will become more prevalent given radio broadcaster ability to provide multiple audio streams.

However, the Commission's approach to the digital conversion is critical. A burdensome, regulatory regime forcing radio broadcasters to incur unnecessary costs should be avoided. The Commission should allow technology and the marketplace to drive the digital radio conversion and provide a flexible regulatory environment that will not only promote innovative services, but also ensure that the Commission's diversity and localism goals are met.

Respectfully submitted,

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June 16, 2004